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PT 529.01: Biomechanics and Exercise Interventions

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PT 529 - Fall 2008
Biomechanics and Exercise Interventions

I. Course Instructors:

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Lab Assistant:
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II. Credits: 2

III. Contact Hours:
Biomechanics (18)
Exercise Interventions Lecture (14)
Exercise Interventions Laboratory (16)
Exams (2)
Practical Exam (20 minutes)

IV. Class/Lab Times:
Tuesday (SB 114/020) 1:10 – 3:00 PM
Thursday (SB 114/020) 1:10 – 3:00 PM

V. Required Textbooks:

Hall, C.M. and Brody, L.T., (2005). *Therapeutic exercise: Moving towards function, 2nd. Ed.*. Philadelphia: Lippincott Williams & Wilkins.

Kisner, C. & Colby, L.A., (2007). *Therapeutic exercise: Foundations and techniques (5th ed.).* Philadelphia, PA: F. A. Davis, Co.

Neumann, D.A., (2002). *Kinesiology of the musculoskeletal system*. St. Louis: Mosby.

Mueller, MJ & Maluf, KS (2002). Tissue adaptation to physical stress: A proposed "physical stress theory" to guide physical therapist practice, education, and research. *Physical Therapy*, 82(4), pp 383-403.

VI. Supplemental Readings: Readings will be available in the required text, texts from another course, however if not a master copy will be placed on Blackboard online at https://bb1.umt.edu/ once you log on follow the PT 529 links.

VII. Course description: This course was developed by the faculty to better integrate exercise prescription/interventions and biomechanics with the other courses offered in the first year curriculum.

VIII. Evaluation Methods:

Mid term exam	30%
Final exam	50%
Case Study	15%
Debate	5%
Informal in lab practical exams	pass/fail

IX. Academic Honesty:

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code.
The Code is available for review online:
http://life.umt.edu/SA/documents/fromWeb/StudentConductCode1.pdf

For information on plagiarism please visit these links:
http://www.rbs2.com/plag.htm
http://owl.english.purdue.edu/owl/resource/589/01/

For help with references:
http://www.apastyle.org/elecref.html

X. Professional Behaviors:

Professional behaviors are expected in the course. These include (but are not limited to): taking responsibility for one's own learning, taking responsibility for one's own work (no cheating or plagiarism), completing group and individual assignments in a timely manner, coming to class on time (unless excused), coming to class prepared, treating fellow students, staff, and faculty with respect, and receiving and giving constructive criticism when appropriate. Cell phones should be turned off and put away. Lap top computers may be used to take notes and when appropriate, search the web for information pertaining to the topic being discussed in class. Other uses of personal computing and communication devices in class are prohibited. Students causing distraction to other students or the instructor will be asked to leave the room for the remainder of the day.

Please refer to the "Generic Abilities" section in your student handbook. Unprofessional behavior will be subject to disciplinary action.

XI. Grading Scale: These course components must be successfully completed with a C or better (> 73). Opportunities to retake tests or the final exam due a failing grade will not be available. Test and exam results will be available on Blackboard online at https://bb1.umt.edu/ once you log on follow the PT 529 links.

Percentage	Grade	Grade Point
90-100	A	4.0
87-89	B+	3.3
83-86	B	3.0
80-82	B-	2.7
77-79	C+	2.3
73-76	C	2.0

XII. Teaching Methods and Learning Experiences
The curricular threads incorporated into this course consist of the Disablement Model, Lifespan Issues, Regulation and Compliance, Evidence-based practice, Prevention, and Documentation. The models presented and utilized in this course consist of the Disablement Model HOAC Problem Solving Model, and Patient/Practitioner Collaborative Model.

Laboratory Participation: For the laboratory experience to be of benefit it will require the full cooperation, attention, and participation of the student. The laboratory instructor will keep track of these necessary traits for each student through the semester and assign an appropriate grade.

Case Study: The case study is one tool that we can assess your ability to integrate assessment findings into a treatment intervention. The case study is an integral part of the laboratory section of this course. The specific details of the requirements and expectations will be forthcoming.

Informal Practical Exams: The practical examinations for this course will be conducted at anytime during the laboratory periods. The specific details will be forthcoming. These practical exams are primarily to assess your exercise prescription skills, although specific questions to assess your knowledge regarding rationale and indications/contraindications are also addressed.

Debate: The class will be divided up into debate teams. Each pair of teams will be provided with a question and be assigned as to which side of the argument they are to support. A panel of “experts” will hear the case and determine the winner based on the persuasiveness of the argument and the evidence presented. The winning team will be awarded the full 5/5% whereas the losing team will be awarded 4/5%. Complete instructions, team assignments and debate questions will be forthcoming.

XIII. Class Schedule:

Tues. Aug 26	Course Introduction & Therapeutic Intervention Model	SB 114
Thurs. Aug. 38	Adaptations to Exercise	SB 114
Tues. Sept. 2	Adaptations to Exercise	SB 114
Thurs. Sept. 4	Adaptations to Exercise	SB 114
Tues. Sept. 9	Adaptations to Exercise	SB 114
Thurs. Sept. 11	Principles of Biomechanics	SB 114
Tues. Sept. 16	Principles of Biomechanics	SB 114
Thurs. Sept. 18	Principles of Biomechanics	SB 114
Tues. Sept. 23	*Exercise Lab – Posture*	SB 020
Thurs. Sept. 25	Stretching/Flexibility	SB 114
Tues. Sept. 30	*Stretching/Flexibility Lab*	SB 020/018
Thurs. Oct. 2	Stretching/Flexibility	SB 114
Tues. Oct. 7	Biomechanics – Cervical Spine	SB 114
Thurs. Oct. 9	Biomechanics – Cervical Spine/Shoulder	SB 114
Tues. Oct. 14	*Exercise Lab – Cervical Spine*	SB 020
Thurs. Oct. 16	*Exercise Lab – Shoulder*	SB 020
Tues. Oct. 21	Biomechanics – Shoulder	SB 114
Thurs. Oct. 23	**Mid Term Exam**	**SB 114**
Tues. Oct. 28	*Exercise Lab – Shoulder*	SB 020
Thurs. Oct. 30	Debate	SB 114
Tues. Nov. 4	**Election Day – Holiday**	
Thurs. Nov. 6	*Exercise Lab – 1RM/8RM/Muscular*	SB20/018/113
Tues. Nov. 11	**Veteran's Day – Holiday**	
Thurs. Nov. 13	Biomechanics – Elbow Endurance	SB0 114
Tues. Nov. 18	*Exercise Lab – Elbow*	SB 020
Thurs. Nov. 20	Biomechanics – Wrist & Hand	SB 114
Tues. Nov. 25	*Exercise Lab – Wrist & Hand*	SB 020
Thurs. Nov. 29	**Thanksgiving Break – Holiday**	
Tues. Dec. 2	Biomechanics – TMJ	SB 114
Thurs. Dec. 4	*Exercise Lab – TMJ/Case Study Reveiw*	SB 020
Thurs. Dec. 11	Final Exam 10:10 AM -12:10 PM	SB 114

XIV. Course Objectives for Exercise Interventions

1 - Knowledge and comprehension
2 - Application
3 - Psychomotor
4 - Analysis, synthesis, and evaluation
5 - Affective
Objectives

Biomechanics and Exercise Unit

A. Basic principles of therapeutic exercise addressing the curricular threads of lifespan, evidence-based practice, prevention, and documentation. **(cc-5.19; cc-5.20; cc-5.25; cc-5.26; cc-5.27; cc-5.30a, b, c, d, e, h, I, k, l, m, p, s, w; cc-5.31; cc-5.34; cc-5.35, cc-5.36; cc-5.37; cc-5.38; cc-5.40; cc-5.42) (EXO-1, 2, 3, 4, 5, 6, 7, 8, 11)**

1.1 List the general categories of exercise and their effect on body tissues (passive, active, resisted, endurance, coordination, relaxation). **(CC-5.19, CC-5.20, CC-39a) (EXO-1)**

1.2 Give the goals for use of each type exercise. **(CC-5.19, CC-5.20, CC-39a) (EXO-1)**

1.3 Discuss the contraindications for each type of exercise. **(CC-5.19, CC-5.20, CC-39a) (EXO-1)**

1.4 Name exercise equipment, which will accomplish each category of exercise. **(CC-5.19, CC-5.20, CC-39a) (EXO-1)**

1.5 List the circumstances where an exercise program should be terminated. **(CC-5.19, CC-5.20) (EXO-1)**

2.1 Describe "specificity of exercise" and relate this principle to a given case. **(CC-5.19, CC-5.20) (EXO-1**

2.2 Identify the factors that may require further physician attention in order to provide an appropriate/safe exercise program. **(CC-5.27, CC-5.30a, b, c, d, e, h, I, k, l, m, p, s, w, CC-5.34) (EXO-1, 8)**

2.3 Describe the acute and chronic cardiovascular and neuromuscular adaptations to a progressive exercise program. **(CC-5.19, CC-5.20) (EXO-1)**

2.4 Describe the importance of collaborating with the patient/client, family and other health professionals in the development of and exercise intervention. **(CC-5.26) (EXO-6, 8)**

2.5 Describe the role of a PTA in the implementation of an exercise intervention. **(CC-5.40) (EXO-6, 8)**

3.1 Demonstrate appropriate exercise for given case, including patient position, verbal directions, equipment, speed, repetitions, duration, type of contraction, etc. **(CC-5.19, CC-5.20, CC-39a) (EXO-1, 2, 4)**

3.2 Write a concise and clear home exercise program using the practical guidelines discussed in class and/or from the available literature. **(CC-5.19, CC-5.20, CC-5.31, CC-5.42) (EXO-2, 3, 4, 11)**

3.3 Document therapeutic exercises clearly and concisely. **(CC-5.42) (EXO-11)**

3.4 Demonstrate the ability to determine if the exercise program is progressing appropriately and under what circumstances would you refer your client for physician consultation to address your concerns. **(CC-5.19, CC-5.20, CC-5.27, CC-5.34, CC-5.38) (EXO-1, 2, 3, 4, 5)**

3.5 Demonstrate the ability to extract the pertinent information for an initial examination and create an exercise intervention. **(CC- 5.30a, b, c, d, e, h, I, k, l, m, p, s, w) (EXO-2)**

3.6 Demonstrate the ability to appropriately adjust the plan of care (exercise intervention) based on the patient/clients response to the program. **(CC-5.19, CC-5.20, CC-5.25, CC-5.38) (EXO-2, 3, 4, 5)**

3.7 Demonstrate the ability to appropriately adjust an established protocol (exercise intervention) based on the patient/clients response to the protocol. **(CC-5.19, CC-5.20, CC-5.25, CC-5.38) (EXO-1, 4)**

4.1 Given a written physical examination, create an exercise program: integrating the problem list and goals, function, and principles of biomechanics. **(CC-5.42) (EXO-3, 4**

4.2 Critique an exercise protocol for a given case and offer alternative approaches based on personal experience and the literature. **(CC-5.23, CC-5.24) (EXO-4)**

4.3 Compare and contrast exercise equipment for a given case. **(CC-5.19, CC-5.20, CC-39a) (EXO-1**

4.4 Provide the rationale for a given exercise prescription, protocol component, or exercise progression based on the available literature. **(CC-5.19, CC-5.20, CC-39a) (EXO-1, 5**

5.1 Participates and practices in and out of class. **(EXO-13)**

5.2 Effectively teaches classmates exercise programs including the following components: **(CC-39a, CC-5.41) (EXO-5, 7)**

1. Strengthening/ Resistive
    a. Isotonic
    b. Isometric
    c. Concentric
    d. Eccentric
    e. Open chain
    f. Closed chain
    g. Muscle soreness
2. Endurance
3. Mobility and flexibility
    a. Passive ROM
    b. Stretching
    c. Active-assisted and active
4. Coordination, balance, and skill
5. Equipment
    a. Isokinetic dynamometers
    b. Weight room (selectorized and free)
    c. Ergometers (cycle, treadmill, & arm)
    d. Hydraulic equipment

e. Isotonic equipment
f. Elastics
g. Gymnastic Balls
h. Misc. (items found in clients homes)

B. Basic principles of biomechanics, normal tissue response to forces, and pathomechanics. **(cc-5.20; cc-5.22; cc-5.23) (EXO-1, 2, 3)**

1.1 Describe basic biomechanical principles related to therapeutic exercise and ergonomics. **(CC-5.20) (EXO-1)**
1.2 Give normal and abnormal response to external forces. **(CC-5.20) (EXO-1)**
1.3 Describe normal and abnormal forces at specific joints. **(CC-5.20) (EXO-1)**
2.1 Create a specific exercise for a given pathology and dysfunction. **(CC-5.20) (EXO-1)**
2.2 Predict tissue damage with a given force. **(CC-5.20, CC-5.22. CC-5.23) (EXO-1, 2, 3)**